CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/W.No.08/KRSK/CSR-09/137b/CEMENT/2016-17 Date: 09.09.2016

TEST REPORT ON CEMENT

*** CUSTOMER**	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
***AGENCY**	:	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
***NAME OF THE WORK**	:	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
***REFERENCE**	:	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
SAMPLE ID	:	Cement
SAMPLE RECEIVED ON	:	07.09.2016
PERIOD OF TESTING	:	07.09.2016 to 09.09.2016

The results of the tests conducted on the cement sample are as follows:

Sl. No	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 8112-2013
1	Standard Consistency	IS-4031 (Part -4) 1988(RA-2009)	29.00 %	-
2	a) Initial Setting Time	IS-4031 (Part -5) 1988(RA-2009)	145 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part -5) 1988(RA-2009)	485 Minutes	Not More than 600 Minutes
3	Soundness by Le Chartlier Method	IS-4031 (Part-3) 1988(RA-2009)	1 mm	Not more than 10mm

*Information is furnished by the Customer/Representative.

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****

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Job No.: CTCE/BBMP/W.No.08/KRSK/CSR-09/137b/SAND-Gradation/2016-17 : 09.09.2016

TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. K.R. Santhosh Kumar,**
#04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.

*** Name of Work** : Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016

Technical Reference : IS : 2386 Part 1 - 1963 RA-2007

Sample ID : Fine Aggregates

Sample Received on : 07.09.2016

Date of Testing : 09.09.2016

Total Wt. of Aggregates in gms **1000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)			
		Zone-I	Zone-II	Zone-III	Zone-IV
10	100	100	100	100	100
4.75	96.10	90-100	90-100	90-100	95-100
2.36	77.60	60-95	75-100	85-100	95-100
1.18	56.60	30-70	55-90	75-100	90-100
600 Micron	27.60	15-34	35-59	60-79	80-100
300 Micron	16.10	5-20	8-30	12-40	15-50
150 Micron	4.60	0-10	0-10	0-10	0-15

* Information is furnished by the Customer/Representative

Remarks : This sample is under Zone-I specific limits.

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Job No.: CTCE/BBMP/W.No.08/KRSK/CSR-09/137b/AGG/GR/2016-17 : 09.09.2016

TEST REPORT ON DETERMINATION GRADATION OF COARSE AGGREGATES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. K.R. Santhosh Kumar,**
#04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.

*** Name of Work** : Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016

Technical Reference : IS : 2386 Part 1 -1963 RA-2007

Sample ID : Coarse Aggregates (40mm)

Sample Received on : 07.09.2016

Date of Testing : 09.09.2016

Total Wt. of Aggregates in gms= **7000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)	
		Graded	Single Sized
80	100	100	-
63	100	-	100
40	97.86	95-100	85-100
20	51.43	30-70	0-20
10	23.00	10-35	0-5
4.75	2.29	0-5	-

AE-8

* Information is furnished by the Customer/Representative

Remarks : This sample is under Graded specific limits.

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Job No.: CTCE/BBMP/W.No.08/KRSK/STEEL/2016-17 09.09.2016

TEST REPORT ON REINFORCEMENT STEEL

Customer	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	:	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of the Work	:	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	:	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Date of Test	:	09.09.2016
Technical Reference	:	IS: 1786-2008

Sl. No	Nominal size (dia) (mm)	Mass per metre (Kg/mtr)	TENSILE STRENGTH			Bend Test	Rebend Test
			0.20% proof stress/Yield stress N/mm^2	Tensile strength (Ultimate stress) N/mm^2	Elongation percent gauge length		
1	10	0.62	419	491	15.15	O.K	O.K

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Job No.: CTCE/BBMP/W.No.08/KRSK/STEEL/2016-17 09.09.2016

TEST REPORT ON REINFORCEMENT STEEL

Customer	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	:	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of the Work	:	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	:	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Date of Test	:	09.09.2016
Technical Reference	:	IS: 1786-2008

Sl. No	Nominal size (dia) (mm)	Mass per metre (Kg/mtr)	TENSILE STRENGTH			Bend Test	Rebend Test
			0.20% proof stress/Yield stress N/mm^2	Tensile strength (Ultimate stress) N/mm^2	Elongation percent gauge length		
1	16	1.58	423	496	15.65	O.K	O.K

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Job No.: CTCE/BBMP/W.No.08/KRSK/WMM/Gradation/2016-17 12.09.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

Agency : **Mr. K.R. Santhosh Kumar,**
#04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.

Name of Work : Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016

Date of Testing : 12.09.2016

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **7680**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	150	150	2.0	98.0	95-100
22.4	2285	2435	31.7	68.3	60-80
11.2	1210	3645	47.5	52.5	40-60
4.75	1095	4740	61.7	38.3	25-40
2.36	990	5730	74.6	25.4	15-30
0.600	850	6580	85.7	14.3	8-22
0.075	800	7380	96.1	3.9	0-8

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Job No.: CTCE/BBMP/W.No.08/KRSK/WMM/AIV/2016-17 12.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of the Work	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	12.09.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	378	380	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	78	79	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	301	
4	Aggregate Impact value = percent fines	20.63	20.79	
	100* (W_2/W_1)%			**20.71**

AE-B

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/W.No.08/KRSK/WMM/S-T/2016-17 12.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of Work	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	12.09.2016

AE-8

Result : Flakiness Index = **11.23%**

Elongation Index = **13.25%**

Result : Combined Flakiness & Elongation index 24.48%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/W.No.08/KRSK/SDBC/AIV/2016-17 19.10.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of the Work	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	19.10.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	82	83	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	302	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.47	21.56	**21.51**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.08/KRSK/SDBC/Shape_T/2016-17 : 19.10.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of Work	: Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 19.10.2016

Result : Flakiness Index = **11.35%**

Elongation Index = **13.92%**

Result : Combined Flakiness & Elongation index **25.27%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.08/KRSK/SDBC/Stripping/2016-17 19.10.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.**
Agency	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of the work	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	19.10.2016

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

AE-B

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.08/KRSK/SDBC/Sp_Wa/2016-17 19.10.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
Name of the Work	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	19.10.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2005	2006	2007	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1250	1251	1252	
4	Weight of saturated surface dry aggregate in air	W_3 g	2012	2013	2014	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	762	762	762	
6	Weight of oven dried aggregate	W_4 g	1999	2001	2002	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.623	2.626	2.627	2.626
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.669	2.668	2.669	2.669
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.65%	0.60%	0.60%	0.62%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.08/KRSK/SDBC/Bitumen/2016-17 19.10.2016

BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. K.R. Santhosh Kumar,** #04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.
NAME OF THE WORK	Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016
SAMPLE I/D	Roads in Sahakaranagara
DATE OF TESTING	19.10.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475.5	473.5
3. Weight of Asphalt and Mineral matter Extracted,	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	24.5	26.50
7. Bitumen content in %	4.90	5.30
8. Average	**5.10**	

AE-8

GRADATION AFTER EXTRACTION

SIEVE SIZE	Trail 1				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	33.25	6.99	6.99	93.01	90-100
4.75	260.5	54.78	61.78	38.22	35-51
2.36	36.33	7.64	69.42	30.58	24-39
1.18	42.32	8.90	78.32	21.68	15-30
0.3	42.32	8.90	87.22	12.78	9-19
0.075	30.22	6.36	93.57	6.43	3-8

SIEVE SIZE	Trail 2				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	31.28	6.26	6.26	93.74	90-100
4.75	263.5	52.70	58.96	41.04	35-51
2.36	59.65	11.93	70.89	29.11	24-39
1.18	51.32	10.26	81.15	18.85	15-30
0.3	40.22	8.04	89.19	10.81	9-19
0.075	31.23	6.25	95.44	4.56	3-8

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CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/W.No.08/KRSK/CSR-09/137b/CUBE/2016-17 13.10.2016

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. K.R. Santhosh Kumar,**
#04, 1st A Main, V. Pura, AVR Block, Virupakshapura Vidyaranyapura (P), Bangalore.

*** Name of the work** : Improvements to Roads and Drains at Sahakaranagara surroundings in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.

*** Reference** : EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016

*** Sample ID** : Cement Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

*** Grade of Concrete** : M_{15}

Compressive Strength as on : 28th day

Sample Received on : 13.10.2016

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	15.09.2016	13.10.2016	8.098	362.3	16.10
2	15.09.2016	13.10.2016	8.190	369.6	16.43
3	15.09.2016	13.10.2016	8.238	385.3	17.12

* Information is furnished by the Customer/Representative

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Quality Manager

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*** Agency** : **Mr. K.R. Santhosh Kumar,**
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*** Reference** : EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016

*** Sample ID** : Drain Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

*** Grade of Concrete** : M_{20}

Compressive Strength as on : 28th day

Sample Received on : 14.10.2016

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	16.09.2016	14.10.2016	8.123	478.3	21.26
2	16.09.2016	14.10.2016	8.280	493.6	21.94
3	16.09.2016	14.10.2016	8.365	512.3	22.77

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*** Reference** : EE/BTP/BBMP/E-PMT/197/2015-16 Dated: 03.02.2016

*** Sample ID** : Drain Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

*** Grade of Concrete** : M_{20}

Compressive Strength as on : 28th day

Sample Received on : 14.10.2016

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	16.09.2016	14.10.2016	8.115	482.3	21.44
2	16.09.2016	14.10.2016	8.230	496.3	22.06
3	16.09.2016	14.10.2016	8.382	510.2	22.68

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*** Sample ID** : Drain Concrete

A&S

Size of cubes : 150mmx150mmx150mm

2

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

*** Grade of Concrete** : M_{20}

Compressive Strength as on : 28th day

Sample Received on : 14.10.2016

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	16.09.2016	14.10.2016	8.120	485.9	21.60
2	16.09.2016	14.10.2016	8.225	498.9	22.17
3	16.09.2016	14.10.2016	8.337	516.3	22.95

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*** Sample ID** : Drain Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

AE-8

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

*** Grade of Concrete** : M_{20}

Compressive Strength as on : 28th day

Sample Received on : 14.10.2016

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	16.09.2016	14.10.2016	8.138	475.5	21.13
2	16.09.2016	14.10.2016	8.280	490.3	21.79
3	16.09.2016	14.10.2016	8.310	510.2	22.68

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